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First Named Inventor	Bang, Won B.
Art Unit	2823
Examiner Name	William D. Coleman
Attorney Docket Number	A7695/T51600

ENCLOSURES *(Check all that apply)*

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Communication - Comments on Statement of Reasons for Allowance.
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PATENT
Attorney Docket No.: A7695/T51600

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	Examiner: William D. Coleman
WON B. BANG et al.	Art Unit: 2823
Application No.: 10/712,464	COMMUNICATION - COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE
Filed: November 12, 2003	
For: RAMP TEMPERATURE TECHNIQUES FOR IMPROVED MEAN WAFER BEFORE CLEAN	

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P.O. Box 1450
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Sir:

Applicants note that claim 7 recites:

7. A method of operating a substrate processing chamber, the method comprising:

transferring a first substrate into the substrate processing chamber and heating the substrate to a first temperature of at least 510°C;

depositing an insulating layer over the first substrate while reducing the temperature of the substrate from the first temperature to a second temperature that is lower than the first temperature;

transferring the first substrate out of the substrate processing chamber;

removing unwanted deposition material formed on interior surfaces of the chamber during the depositing step by introducing reactive halogen species into the chamber while increasing the temperature of chamber;

transferring a second substrate into the substrate processing chamber and heating the substrate to the first temperature; and

depositing an insulating layer over the second substrate while reducing the temperature of the substrate from the first temperature to the second temperature;

wherein the insulating layer deposited during each depositing step is deposited within trenches formed for a shallow trench isolation structure on an integrated circuit.

Applicants also note that claim 13 recites:

13. A method of operating a substrate processing chamber having a substrate heater, the method comprising:

transferring a first substrate into the substrate processing chamber and heating the heater to a first set point that causes the substrate to be heated to a first temperature of at least 510°C;

depositing an insulating layer over the first substrate while reducing the temperature of the heater to a second set point thereby reducing the temperature of the substrate from the first temperature to a second temperature that is lower than the first temperature;

transferring the first substrate out of the substrate processing chamber;

removing unwanted deposition material formed on interior surfaces of the chamber during the depositing step by introducing reactive halogen species into the chamber while increasing the temperature of the heater from a third set point that is lower than the first set point to a fourth set point that is lower than the first set point;

transferring a second substrate into the substrate processing chamber and heating the heater to the first set point substrate to the first temperature; and

depositing an insulating layer over the second substrate while reducing the temperature of the substrate from the first temperature to the second temperature;

wherein the insulating layer comprises silicon oxide deposited from a process gas comprising ozone and TEOS.

Applicants also note that claim 15 recites:

15. A method of operating a substrate processing chamber having a substrate heater, the method comprising:

transferring a first substrate into the substrate processing chamber and heating the heater to a first set point that causes the substrate to be heated to a first temperature of at least 510°C;

depositing an insulating layer over the first substrate while reducing the temperature of the heater to a second set point thereby reducing the temperature of the substrate from the first temperature to a second temperature that is lower than the first temperature;

transferring the first substrate out of the substrate processing chamber;

removing unwanted deposition material formed on interior surfaces of the chamber during the depositing step by introducing reactive halogen species into the chamber while increasing the temperature of the heater from a third set point that is lower than the first set point to a fourth set point that is lower than the first set point;

transferring a second substrate into the substrate processing chamber and heating the heater to the first set point substrate to the first temperature; and

depositing an insulating layer over the second substrate while reducing the temperature of the substrate from the first temperature to the second temperature;

wherein the substrate is heated by a substrate heater embedded in a ceramic pedestal during the removing step.

Applicants also note that claim 17 recites:

17. A method of operating a substrate processing chamber having a substrate heater, the method comprising:

transferring a first substrate into the substrate processing chamber and heating the heater to a first set point that causes the substrate to be heated to a first temperature of at least 510°C;

depositing an insulating layer over the first substrate while reducing the temperature of the heater to a second set point thereby reducing the temperature of the substrate from the first temperature to a second temperature that is lower than the first temperature;

transferring the first substrate out of the substrate processing chamber;

removing unwanted deposition material formed on interior surfaces of the chamber during the depositing step by introducing reactive halogen species into the chamber while increasing the temperature of the heater from a third set point that is lower than the first set point to a fourth set point that is lower than the first set point;

transferring a second substrate into the substrate processing chamber and heating the heater to the first set point substrate to the first temperature; and

depositing an insulating layer over the second substrate while reducing the temperature of the substrate from the first temperature to the second temperature;

wherein the insulating layer deposited during each depositing step is deposited within trenches formed for a shallow trench isolation structure on an integrated circuit.

Applicants also note that claim 18 recites:

18. A method of operating a substrate processing chamber of the type used to fabricate integrated circuits, the method comprising:

transferring a first substrate into the substrate processing chamber;

depositing a silicon oxide film over the first substrate by introducing TEOS and ozone gases into the chamber and maintaining the chamber at a pressure of between about 45 to 700 Torr, wherein the depositing step includes forming a first portion of the silicon oxide film while heating the substrate to a temperature of at least 510°C using a substrate heater and forming a second portion of the silicon oxide film over the first portion while reducing the temperature of the substrate;

transferring the substrate out of the chamber;

thereafter, removing unwanted deposition material from interior surfaces of the chamber by introducing a fluorine-containing etchant gas into the chamber;

during the removing step, ramping up the temperature of the substrate heater to increase the chamber temperature;

transferring a second substrate into the substrate processing chamber; and

depositing a silicon oxide film over the second substrate disposed by introducing TEOS and ozone gases into the chamber and maintaining the chamber at a pressure of between

about 45 to 700 Torr, wherein the depositing step includes forming a first portion of the silicon oxide film while heating the substrate to a temperature of at least 510°C using a substrate heater and forming a second portion of the silicon oxide film over the first portion while reducing the temperature of the substrate.

Applicants also note that claim 25 recites:

25. A method of operating a substrate processing chamber having at least interior surface comprising one aluminum, aluminum oxide or aluminum nitride, the method comprising:

transferring a first substrate into the substrate processing chamber;

depositing a dielectric layer over the first substrate using a high temperature chemical vapor deposition in which the substrate reaches a peak temperature of at least 510°C and at the conclusion of the depositing step the temperature of the substrate is reduced from the peak temperature to a second temperature that is at least 30°C lower than the peak temperature, wherein the depositing step results in unwanted dielectric material being deposited on the least one interior surface of the chamber;

transferring the first substrate out of the substrate processing chamber;

thereafter, removing the unwanted deposition material formed on the at least one interior surface of the chamber during the depositing step by introducing reactive fluorine species into the chamber;

thereafter, transferring a second substrate into the substrate processing chamber; and

depositing a dielectric layer over the second substrate using a high temperature chemical vapor deposition in which the substrate reaches a peak temperature of at least 510°C and at the conclusion of the depositing step the temperature of the substrate is reduced from the peak temperature to a second temperature that is at least 30°C lower than the peak temperature.

Applicants also note that claim 29 recites:

29. A method of operating a substrate processing chamber, the method comprising:

transferring a first substrate into the substrate processing chamber and heating the substrate to a first temperature of at least 510°C;

depositing an insulating layer over the first substrate while reducing the temperature of the substrate from the first temperature to a second temperature that is lower than the first temperature;

transferring the first substrate out of the substrate processing chamber;

removing unwanted deposition material formed on interior surfaces of the chamber during the depositing step by introducing reactive halogen species into the chamber while increasing the temperature of chamber;

transferring a second substrate into the substrate processing chamber and heating the substrate to the first temperature; and

depositing an insulating layer over the second substrate while reducing the temperature of the substrate from the first temperature to the second temperature,

wherein the substrate processing chamber includes at least one component comprising aluminum, aluminum oxide or aluminum nitride that has a surface upon which unwanted deposition material is formed during each of the depositing steps.

Applicants also note that claim 30 recites:

30. A method of operating a substrate processing chamber having a substrate heater, the method comprising:

transferring a first substrate into the substrate processing chamber and heating the heater to a first set point that causes the substrate to be heated to a first temperature of at least 510°C;

depositing an insulating layer over the first substrate while reducing the temperature of the heater to a second set point thereby reducing the temperature of the substrate from the first temperature to a second temperature that is lower than the first temperature;

transferring the first substrate out of the substrate processing chamber;

removing unwanted deposition material formed on interior surfaces of the chamber during the depositing step by introducing reactive halogen species into the chamber

while increasing the temperature of the heater from a third set point that is lower than the first set point to a fourth set point that is lower than the first set point;

transferring a second substrate into the substrate processing chamber and heating the heater to the first set point substrate to the first temperature; and

depositing an insulating layer over the second substrate while reducing the temperature of the substrate from the first temperature to the second temperature,

wherein the substrate processing chamber includes at least one component comprising aluminum, aluminum oxide or aluminum nitride that has a surface upon which unwanted deposition material is formed during each of the depositing steps.

Applicants also note that claim 31 recites:

31. A method of operating a substrate processing chamber of the type used to fabricate integrated circuits, the method comprising:

transferring a first substrate into the substrate processing chamber;

depositing a silicon oxide film over the first substrate by introducing TEOS and ozone gases into the chamber and maintaining the chamber at a pressure of between about 45 to 700 Torr, wherein the depositing step includes forming a first portion of the silicon oxide film while heating the substrate to a temperature of at least 510°C using a substrate heater and forming a second portion of the silicon oxide film over the first portion while reducing the temperature of the substrate;

transferring the substrate out of the chamber;

thereafter, removing unwanted deposition material from interior surfaces of the chamber by introducing a fluorine-containing etchant gas into the chamber;

during the removing step, ramping up the temperature of the substrate heater to increase the chamber temperature;

transferring a second substrate into the substrate processing chamber; and

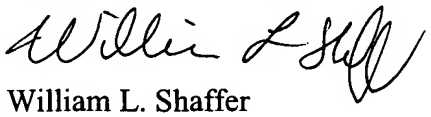
depositing a silicon oxide film over the second substrate disposed by introducing TEOS and ozone gases into the chamber and maintaining the chamber at a pressure of between about 45 to 700 Torr, wherein the depositing step includes forming a first portion of the silicon

oxide film while heating the substrate to a temperature of at least 510°C using a substrate heater and forming a second portion of the silicon oxide film over the first portion while reducing the temperature of the substrate,

wherein the substrate processing chamber includes at least one component comprising aluminum, aluminum oxide or aluminum nitride that has a surface upon which unwanted deposition material is formed during each of the depositing steps.

None of the prior art references teach or suggest a method as recited in any of these claims.

Respectfully submitted,



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